**In The United States Patent and Trademark Office
On Appeal From The Examiner To The Board
of Patent Appeals and Interferences**

In re Application of:	Seemant (nmi) Choudhary et al.
Serial No.:	10/052,886
Filing Date:	January 18, 2002
Group Art Unit:	2613
Examiner:	Agustin Bello
Title:	System and Method for Multi-Level Phase Modulated Communication

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Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Dear Sir:

Appeal Brief

Appellants have appealed to the Board of Patent Appeals and Interferences from the decision of the Examiner finally rejecting Claims 12, 14-19, 37, 39-50 and 52 as evidenced in the Final Office Action electronically sent February 22, 2007. Appellants filed a Notice of Appeal on April 12, 2007. Appellants respectfully submit this Appeal Brief with the statutory fee of $500.00.

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Real Party In Interest

This application is currently owned by Fujitsu Limited as indicated by an assignment recorded on December 6, 2005, in the Assignment Records of the United States Patent and Trademark Office at Reel 017091, Frame 0459.

Related Appeals and Interferences

There are no known appeals or interferences which will directly affect or be directly affected by or have a bearing on the Board's decision regarding this appeal.

Status of Claims

Claims 12, 14-19, 37, 39-50 and 52 are pending in this application and all stand rejected under a final Office Action electronically sent February 22, 2007. Claims 13 and 38 have been canceled and Claims 1-11, 20-36, and 51 have been withdrawn. Appellants present Claims 12, 14-19, 37, 39-50 and 52 for appeal. Appendix A shows these claims involved in this appeal.

Status of Amendments

All amendments presented by the Appellants were entered by the Examiner before the issuance of a Final Office Action.

Summary of Claimed Subject Matter

Independent Claim 12 of the present application recites a method for receiving a signal that includes generating a polarized local signal based on receiver-side feedback (as an example only and not by way of limitation, see Page 13, line 27 – Page 14, line 4; see Figure 6, components 70, 72 and 74) and combining an ingress traffic signal with the polarized local signal to generate a combined signal (as an example only and not by way of limitation, see Page 12, line 32 – Page 13, line 9; see Figure 6, component 62). The ingress traffic signal is compensated for polarization mode dispersion (as an example only and not by way of limitation, see Page 14, lines 5-10). In addition, the method includes splitting the combined signal into a first split signal and second split signal (as an example only and not by way of limitation, see Page 13, lines 10-22; see Figure 6, component 64), and detecting the first and second split signals (as an example only and not by way of limitation, see Page 13, lines 23-26; see Figure 6, component 66).

Independent Claim 37 of the present application recites a system for receiving a signal that includes a means for receiving a signal (as an example only and not by way of limitation, see Page 12, line 32 – Page 13, line 1; see Figure 6, component 62). The received signal is compensated for polarization mode dispersion (as an example only and not by way of limitation, see Page 14, lines 5-10). The system also includes a means for providing a local signal and a means for controlling a polarization of the local signal to generate an appropriately polarized local signal (as an example only and not by way of limitation, see Page 13, line 27 – Page 14, line 4; see Figure 6, components 72 and 74). Furthermore, the system includes a means for combining the polarized local signal and received signal (as an example only and not by way of limitation, see Page 13, lines 1-9; see Figure 6, component 62). The system also includes a means for splitting the combined signal into a first split signal and a second split signal (as an example only and not by way of limitation, see Page 13, lines 10-22; see Figure 6, component 64), and means for detecting the first and second split signals (as an example only and not by way of limitation, see Page 13, lines 23-26; see Figure 6, component 66). In addition, the system includes a means for generating feedback to modify the local signal (as an example only and not by way of limitation, see Page 13, line 27 – Page 14, line 4; see Figure 6, component 70).

Independent Claim 52 of the present application recites an optical receiver that includes a local oscillator that is optically coupled to a quarter wave plate and that is operable to generate an optical signal, where the quarter wave plate is optically coupled to a first beam splitter and is operable to receive an optical signal, circularly polarize the optical signal to generate a circularly polarized signal, and transmit the polarized signal to the first beam splitter (as an example only and not by way of limitation, see Page 13, line 27 – Page 14, line 4; see Figure 6, components 70, 72 and 74). Furthermore, the first beam splitter is optically coupled to a second polarization beam splitter and is operable to receive an optical traffic signal, combine the optical traffic signal with the circularly polarized signal to generate a combined signal, and transmit the combined signal to the second polarization beam splitter (as an example only and not by way of limitation, see Page 12, line 32 – Page 13, line 9; see Figure 6, components 62 and 24). The optical traffic signal is compensated for polarization mode dispersion (as an example only and not by way of limitation, see Page 14, lines 5-10). In addition, the second polarization beam splitter is optically coupled to a first photodiode and a second photodiode and is operable to receive the combined signal, split the combined signal into a first split signal and a second split signal, and transmit the first split signal to the first photodiode and the second split signal to the second photodiode (as an example only and not by way of limitation, see Page 13, lines 10-22; see Figure 6, components 64 and 24). Moreover, the first and second photodiodes are coupled to a decision circuit and are operable to receive the first and second split signals (respectively), generate first and second data signals (respectively) based on the first and second split signals (respectively), and transmit the first and second data signals (respectively) to the decision circuit (as an example only and not by way of limitation, see Page 13, lines 23-26; see Figure 6, components 66 and 67). The decision circuit is coupled to a feedback control module and is operable to determine a desired optical signal generated by the local oscillator generate a control signal based on the desired optical signal, and transmit the control signal to the feedback control module (as an example only and not by way of limitation, see Page 13, lines 23-26; see Figure 6, component 68). The feedback control module is coupled to the local oscillator and is operable to generate an oscillator control signal based on the control signal (as an example only and not by way of limitation, see Page 13, line 27 – Page 14, line 4; see Figure 6, component 70), and the local oscillator is operable to receive the oscillator control signal and

modify the optical signal based on the oscillator control signal (as an example only and not by way of limitation, see Page 13, line 27 – Page 14, line 4; see Figure 6, component 72).

Particular embodiments of the present invention may be better understood with reference to Figure 6 of the application. FIGURE 6 illustrates details of an the optical receiver 8 in accordance with one embodiment of the present invention. First splitter 62 of receiver 8 is operable to receive an optical signal at an ingress section from optical link 24 and to combine that signal with a local oscillator signal received from the optical link 24 connecting first splitter 62 to quarter wave plate 74. First splitter 62 is operable to combine these two signals and transmit them along optical link 24 to polarization beam splitter 64. (Page 12, line 26 – Page 13, line 4).

Polarization beam splitter 64 is operable to split the signal received from first splitter 62 into discreet signals or otherwise passively generate discreet signals based on the received signal. Polarization beam splitter 64 is operable to split the signal received from first splitter 62 into its transverse electric (TE) and transverse magnetic (TM) components. Thus, in this embodiment, any phase error in the local oscillator 72 will only result in signal attenuation, not cross-talk. Thus, the polarization beam splitter 64 is operable to split the received signal into its I and Q components by differentiating between the different polarizations associated with each component. That is, transverse electric (TE) for the in-phase component and transverse magnetic (TM) for the quadrature component. Each component is received by a photodiode 66 which, as mentioned below, converts the signals into an electrical signal which is then processed by decision circuit 68. The split signals from polarization beam splitter 64 travel along optical links 24 to photodiodes 66. (Page 13, lines 10-22).

Photodiodes 66 are operable to convert the optical signals received from the polarization beam splitter 64 into electrical signals, which are then transmitted along electrical links 67 to decision circuit 68. Decision circuit 68 then retrieves the various components of the optical signals and converts them into the intended data streams. Decision circuit 68 is connected to a feedback control 70 along an electrical link 67. Feedback control 70 is operable to modify the output of local oscillator 72 through a control link via electrical link 67, based on information received from decision circuit 68. Feedback control 70

operates in a fashion similar to a phase lock loop (PLL), and is used to minimize phase noise. The local oscillator signal travels along optical link 24 to quarter wave plate 74. Quarter wave plate 74 is operable to transform a linearly polarized signal received from local oscillator 72 into circular polarization and to transmit that circularly polarized signal along optical link 24 for combination with the input signal at first splitter 62. (Page 13, line 23 – Page 14, line 4).

In the embodiment of Figure 6, it is assumed that the received light at first splitter 62 has already been aligned with the I component of the signal, that is, the received signal is in transverse electric (TE) polarization. This may be performed by, for example, an automatic polarization controller (APC) device, or other suitable devices. The signal received by first splitter 62 may also be filtered with a polarization mode dispersion compensator (PMDC) device along with the automatic polarization controller (APC). It will also be understood by those skilled in the art that where the local oscillator 72 emits circularly polarized light, there is no need for the quarter wave plate 74. (Page 14, lines 5-12).

Ground of Rejection to be Reviewed on Appeal

Appellants request that the Board review the following rejections:

- The Examiner's rejection of Claims 12 and 15-19 under 35 U.S.C. §102(b) as being anticipated over by Noe et al., "Comparison of Polarization Handling Methods in Coherent Optical System" ("*Noe*").

- The Examiner's rejection of Claims 14, 37, 39-50 and 52 under 35 U.S.C. § 103(a) as being unpatentable over *Noe* in view of Brain et al., "Progress Towards the Field Deployment of Coherent Optical Fiber Systems" ("*Brain*").

<u>Argument</u>

The Examiner's rejections of Claims 12, 14-19, 37, 39-50 and 52 is improper, and the Board should withdraw these rejections for the reasons given below.

I. <u>The Examiner's Rejection of Claims 12 and 15-19 is Improper</u>

Claims 12 and 15-19 are rejected under 35 U.S.C. §102(b) as being unpatentable over *Noe*. "A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 2 U.S.P.Q.2d 1051, 1053 (Fed. Cir. 1987); M.P.E.P § 2131. In addition, "[t]he identical invention <u>must</u> be shown in as complete detail as is contained in the . . . claims" and "[t]he elements <u>must</u> be arranged as required by the claim." *Richardson v. Suzuki Motor Co.*, 9 U.S.P.Q.2d 1913, 1920 (Fed. Cir. 1989); *In re Bond*, 15 U.S.P.Q.2d 1566 (Fed. Cir. 1990); M.P.E.P § 2131 (*emphasis added*). In regard to inherency of a reference, "[t]he fact that a certain result or characteristic <u>may</u> occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic." M.P.E.P § 2112 (citing *In re Rijckaert*, 9 F.3d 1531, 1534, 28 U.S.P.Q.2d 1955, 1957 (Fed. Cir. 1993) (*emphasis original*). Thus, in relying upon the theory of inherency, an Examiner must provide a basis in fact and/or technical reasoning to support the determination that the allegedly inherent characteristic <u>necessarily</u> flows from the teachings of the applied prior art. M.P.E.P § 2112 (citing *Ex Parte Levy,* 17 U.S.P.Q.2d 1461, 1464 (Bd. Pat. at App. and Inter. 1990) (*emphasis original*).

Independent Claim 12 recites the following limitations:

> A method for receiving a signal, comprising:
> generating a polarized local signal based on receiver-side feedback;
> combining an ingress traffic signal with the polarized local signal to generate a combined signal, wherein the ingress traffic signal is compensated for polarization mode dispersion;
> splitting the combined signal into a first split signal and second split signal;
> detecting the first split signal; and
> detecting the second split signal.

Appellants respectfully submit that this claim is allowable at least because *Noe* does not disclose that "the ingress traffic signal is compensated for polarization mode dispersion." Regarding this limitation, the Office Action concedes that *Noe* fails to explicitly teach this limitation. However, the Office Action asserts that this limitation is inherently taught in *Noe's* disclosure of a polarization diversity receiver (citing to Figures 10-13). Furthermore, in the Response to Arguments section of the Final Office Action, the Examiner provides an entire paragraph which Appellants assume is the Examiner's assertion of what is common knowledge in the art. Although Applicants contend that the Examiner has not shown that his description of polarization diversity receivers (specifically the described matching of the polarization of the local oscillator with the polarization of the received optical signal) is in the prior art, Applicants more importantly note that the Examiner has made no connection between the matching of polarization at a polarization diversity receiver (assuming for the sake of argument that this is in the prior art) with compensation of the ingress traffic signal for polarization mode dispersion (PMD).

Applicants note that the Examiner equates the operation polarization diversity receiver in *Noe* to the generating, combining, splitting and detecting steps of Claim 12. The Examiner position appears to be that this process performed at the receiver (combining, splitting and detecting) is the "polarization compensation" that is required to be performed on the ingress traffic signal. However, the compensation being recited in Claim 12 is a specific compensation for PMD that is performed on the ingress signal. As is made clear in the present application, this PMD compensation of the ingress signal is not what is being done in the generating, combining, splitting and detecting steps at the receiver:

> In this embodiment [Figure 6] it is assumed that the received light at first splitter 62 has already been aligned with the I component of the signal, that is, the received signal is in transverse electric (TE) polarization. This may be performed by, for example, an automatic polarization controller (APC) device, or other suitable devices. The signal received by first splitter 62 may also be filtered with a polarization mode dispersion compensator (PMDC) device along with the automatic polarization controller (APC).

(Page 14, lines 5-10). Thus, the ingress signal is compensated for PMD before it is combined with the polarized local signal and then split. This is clear from the language of Claim 12

since that claim recites that the *ingress traffic signal* is compensated for polarization mode dispersion, while the components that combine, split and detect (which the Examiner matches to the components of *Noe's* polarization diversity receiver) are not performing any compensation operations on the ingress traffic signal alone (they combine this signal with the local signal and then split this combine signal). Applicants respectfully submit that Examiner is conflating the functionality of a polarization diversity receiver with the function of compensating an ingress signal from PMD – these are two separate functions.

As noted above, when relying upon the theory of inherency, the M.P.E.P. requires that an Examiner provide a basis in fact and/or technical reasoning to support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art. Appellants respectfully submit that the Examiner has not met this requirement and that such a requirement cannot be met in this case. Nothing in Figures 10-13 indicates or implies that the ingress signal is compensated for polarization mode dispersion. Furthermore, Appellants respectfully submit that a polarization mode dispersion compensating device (for example, a device before the PMC that compensates the ingress signal for PMD) is not shown in Figure 9 of *Noe*, which shows the details of the experimental communication system setup discussed in the paper.

For at least these reasons, Appellants respectfully submit that each and every limitation of Claim 12 is not disclosed in *Noe* and thus request reconsideration and allowance of Claim 12, as well as those claims that depend from Claim 12.

II. The Examiner's Rejection of Claims 14, 37, 39-50 and 52 is Improper

Claims 14, 37, 39-50 and 52 are rejected under 35 U.S.C. § 103(a) as being unpatentable over *Noe* in view of *Brain*. Independent Claims 37 and 52 recite limitations that are similar, although not identical, to the limitations of Claim 12 (including reciting that the received optical signal is compensated for polarization mode dispersion). Therefore, Appellants respectfully submit that Claims 37 and 52 are allowable at least for the same reasons as discussed above with reference to Claim 12. Thus, Appellants request reconsideration and allowance of Claims 37 and 52, as well as the claims that depend from independent Claim 37.

Conclusion

Appellants have demonstrated that the present invention, as claimed, is clearly distinguishable over the prior art cited by the Examiner. Therefore, Appellants respectfully request the Board of Patent Appeals and Interferences to reverse the final rejection of the Examiner and instruct the Examiner to issue a notice of allowance of all claims.

Please charge a fee in amount of $500.00 to cover the filing fee for this Appeal Brief to Deposit Account No. 02-0384 of BAKER BOTTS L.L.P. The Commissioner is also authorized to charge any other fees or credit any overpayments to Deposit Account No. 02-0384 of BAKER BOTTS L.L.P.

Respectfully submitted,

BAKER BOTTS L.L.P.
Attorneys for Appellants

Brian W. Oaks
Reg. No. 44,981

Date: 6/6/07

Correspondence Address:
Customer Number 05073

Appendix A: Claims on Appeal

12. (Previously Presented) A method for receiving a signal, comprising:

generating a polarized local signal based on receiver-side feedback;

combining an ingress traffic signal with the polarized local signal to generate a combined signal, wherein the ingress traffic signal is compensated for polarization mode dispersion;

splitting the combined signal into a first split signal and second split signal;

detecting the first split signal; and

detecting the second split signal.

14. (Original) The method of Claim 12, wherein the polarization is circular.

15. (Original) The method of Claim 12, wherein the first split signal comprises a first component of the received signal.

16. (Original) The method of Claim 12, wherein the second split signal comprises a second component of the received signal.

17. (Original) The method of Claim 12, wherein the ingress traffic signal is optical.

18. (Original) The method of Claim 12, wherein the combined signal is split by a polarization beam splitter (PBS).

19. (Original) The method of Claim 18, wherein the polarization of a first component of the ingress traffic signal is aligned to an axis of the polarization beam splitter.

37. (Previously Presented) A system for receiving a signal comprising:

a means for receiving a signal, wherein the received signal is compensated for polarization mode dispersion;

a means for providing a local signal;

a means for controlling a polarization of the local signal to generate an appropriately polarized local signal;

a means for combining the polarized local signal and received signal;

a means for splitting the combined signal into a first split signal and a second split signal;

a means for detecting the first split signal;

a means for detecting the second split signal; and

a means for generating feedback to modify the local signal.

39. (Original) The system of Claim 37, wherein the signal is received by an automatic polarization controller.

40. (Original) The system of Claim 37, wherein the appropriate polarization of the local signal is circular.

41. (Original) The system of Claim 37, wherein the first split signal comprises a first component of the received signal.

42. (Original) The system of Claim 37, wherein the second split signal comprises an orthogonally polarized second component of the received signal.

43. (Original) The system of Claim 37, wherein the signal is optical.

44. (Original) The system of Claim 37, wherein the local signal is provided by a continuous wave laser.

45. (Original) The system of Claim 37, wherein the local signal means yields circularly polarized light.

46. (Original) The system of Claim 37, wherein the means to control polarization is a quarter wave plate.

47. (Original) The system of Claim 37, wherein the combiner means is a 3 decibel splitter.

48. (Original) The system of Claim 37, wherein the combiner means is a half mirror.

49. (Original) The method of Claim 37, wherein the splitting means is a polarization beam splitter; and

a first component of the signal is aligned to an axis of the polarization beam splitter.

50. (Original) The system of Claim 37, wherein the detecting means is a photodiode.

52. (Previously Presented) An optical receiver, comprising:

a local oscillator optically coupled to a quarter wave plate and operable to generate an optical signal;

the quarter wave plate optically coupled to a first beam splitter and operable to receive an optical signal, circularly polarize the optical signal to generate a circularly polarized signal, and transmit the polarized signal to the first beam splitter;

the first beam splitter optically coupled to a second polarization beam splitter and operable to receive an optical traffic signal, combine the optical traffic signal with the circularly polarized signal to generate a combined signal, and transmit the combined signal to the second polarization beam splitter, wherein the optical traffic signal is compensated for polarization mode dispersion;

the second polarization beam splitter optically coupled to a first photodiode and a second photodiode and operable to receive the combined signal, split the combined signal into a first split signal and a second split signal, and transmit the first split signal to the first photodiode and the second split signal to the second photodiode;

the first photodiode coupled to a decision circuit and operable to receive the first split signal, generate a first data signal based on the first split signal, and transmit the first data signal to the decision circuit;

the second photodiode coupled to a decision circuit and operable to receive the second split signal, generate a second data signal based on the second split signal, and transmit the second data signal to the decision circuit;

the decision circuit coupled to a feedback control module and operable to determine a desired optical signal generated by the local oscillator generate a control signal based on the desired optical signal, and transmit the control signal to the feedback control module;

the feedback control module coupled to the local oscillator and operable to generate an oscillator control signal based on the control signal; and

the local oscillator operable to receive the oscillator control signal and modify the optical signal based on the oscillator control signal.

Appendix B: Evidence

NONE

Appendix C: Related Proceedings

NONE